

REMARKS

Claims 1-12 are presently pending in the captioned application. Subsequent to the enclosed amendment, claims 4 and 6 are currently amended, claims 1-3 and 8 are withdrawn, claim 5 is pending as originally filed and claims 9-12 are pending as previously presented.

Claim 4 has been amended to recite that the melt tension and melt flow rate temperature are at 230° C. Support for the amendment can be found in the specification at page 37, line 6 and page 38, line 16.

No new matter within the meaning of § 132 has been added by any of the amendments.

Applicants submit that the cited reference fails to teach all the limitations of the presently pending claims.

Accordingly, Applicants respectfully request the Examiner to enter the indicated amendments of Appendix A and allow all presently pending claims.

**1. Rejection of Claims 4-7 and 9-12 under 35 U.S.C § 112,
second paragraph**

The Office Action rejects claims 4-7 and 9-12 under 35 U.S.C. § 112, ¶ 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Office Action states:

These claims are indefinite because they recite a melt tension and melt flow rate without an accompanying temperature. Clarification is required.

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Applicants respectfully traverse the rejections. However, in the interest of advancing prosecution of the allowed claims, Applicants have amended claim 4 to recite that the melt tension and melt flow rate temperature are at 230° C.

Accordingly, Applicants respectfully request withdrawal of the rejections of the claims under § 112, ¶2.

2. Rejection of Claims 4-7 and 9-12 under 35 U.S.C. § 103(a)

The Office Action rejects claims 4-7 and 9-12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,432,525 ("Gokuraku et al."). The Office Action states:

Gokuraku et al. disclose or suggest the basic claimed process for the production of a propylene resin hollow molded foam article in

which a cylindrical foam having a foam layer is formed by extruding from a die a foamable molten resin comprising a base resin containing a foaming agent, and then placing the cylindrical foam in a mold while in a softened state. Gokuraku et al. appear not to state that the mold is metal, but the examiner takes Official Notice that it is known to shape parisons in a metal mold.

Gokuraku et al. teach or suggest the use of a base resin having the melt tension and melt flow rate characteristics of at least one or (i) - (iv) at column 2, lines 52-60, coupled with the teaching at column 7, lines 56-57 that an "ordinary polypropylene resin" can be added. It is submitted that such "ordinary polypropylene resin" inherently possesses physical properties which meet the limitations of resin (b) in (i) - (iv). It is believed that 1 mN is equivalent to about 0.1 gf (Gokuraku et al. report melt tension in gf units).

Gokuraku et al. teach co-extrusion, as in claim 5, at column 11, lines 30-38 and suggest the aspect of a non-foamed layer at column 5, line 55. Gokuraku et al. teach the aspect of blowing gas into the foam interior, as in claims 6 and 9, at column 14, lines 19-24. Gokuraku et al. also teach the aspect of using carbon dioxide as foaming agent, as in claims 7 and 10-12, at column 9, lines 41-42.

Applicants respectfully traverse the rejections because the resins of Gokuraku et al. do not inherently possess the same properties as that of the claimed invention. As will be shown below, the teachings of Gokuraku et al. do not have the MT and MFR

values for the presently claimed polypropylene resins (a), (b) and (c) constituting the base resins (i) to (iv). The claimed resins are mixtures of (a), (b) and (c) in specified amounts and are used as the base resins wherein each claimed base resins (i) to (iv) satisfies specific conditions. In contrast, Gokuraku et al. does not teach polypropylene resins used in the presently claimed mixing ratios to produce the unexpected effect of resin compositions having excellent properties.

Rule of law

The Federal Circuit has held that anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. Verdegaal Bros. v. Union Oil Co. of California, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Those elements must either be inherent or expressly disclosed and must be **arranged** as in the claim. In re Bond, 15 USPQ2d 1566 (Fed. Cir. 1990). Additionally, there must be no difference between the claimed invention and the reference disclosed, as viewed by a person of ordinary skill in the art. Richardson v. Suzuki Motor Co., 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The prior art reference must also be enabling, thereby placing

the allegedly disclosed matter in the possession of the public. In re Brown, 329 F.2d 1006, 1011, 241 USPQ 245, 249 (C.C.P.A. 1964). In order to accomplish this, the reference must be so particular and definite that from it alone, without experiment or the exertion of his own inventive skill, any person versed in the art to which it pertains could construct and use it. Id. at 250.

Finally, the Federal Circuit has made clear that a negative pregnant is not enough to show anticipation. Rowe v. Dror, 112 F.3d 473, 42 USPQ2d 1550 (Fed. Cir. 1997). Thus, where a reference does not **explicitly** describe anything inconsistent with a claimed use, if that reference nevertheless fails to make an affirmative suggestion of the claimed limitations, that reference cannot anticipate the claimed use. Id.

Presently pending claims

The independent process claim 4 recites a process for the production of a polypropylene resin hollow molded foam article, in which a cylindrical foam having a foam layer is formed by extruding from a die a foamable molten resin comprising a base resin containing a foaming agent, and then placing said cylindrical foam in a metal mold while in a softened state, wherein the base resin

is one selected from among the following (i), (ii), (iii), and (iv):

(i) a resin composed of

at least 20 wt% and less than 70 wt% (a) polypropylene resin
melt tension of at least 98 mN at 230° C and
melt flow rate of 0.5 to 15 g/10 minutes at 230° C and
over 30 wt% and no more than 80 wt% (b) polypropylene resin
melt tension of less than 30 mN (excluding 0) at 230° C
and
melt flow rate of 2 to 30 g/10 minutes at 230° C

(the combined amount of (a) and (b) being 100 wt%);

(ii) a resin composed of

30 to 70 wt% (c) polypropylene resin
melt tension of at least 30 mN and less than 98 mN at
230° C and
melt flow rate of 2 to 15 g/10 minutes at 230° C and
30 to 70 wt% (b) polypropylene resin as described above
(the combined amount of (c) and (b) being 100 wt%);

(iii) a resin composed of

at least 20 wt% and less than 70 wt% (a) polypropylene
resin as described above
over 30 wt% and no more than 80 wt% (c) polypropylene

resin as described above

(the combined amount of (a) and (c) being 100 wt%) at 230° C;

(iv) a resin composed of

- (a) a polypropylene resin as described above
- (b) a polypropylene resin as described above and
- (c) a polypropylene resin as described above

with (a) accounting for 5 to 65 wt%,

- (b) for 30 to 78 wt%, and
- (c) for 5 to 65 wt%

(with the combined amount of (a), (b), and (c) being 100 wt%),

and

said resin having a composition within the bounds of a quadrangle ABCD (including on the lines of the quadrangle) drawn by connecting with straight lines the: four points A (17, 78, 5), B (5, 72, 23), C (5, 30, 65) , and D (65, 30, 5) which are component coordinates (x, y, z) where the polypropylene resin (a) component is given as x wt%, the polypropylene resin (b) component is given as y wt%, and the polypropylene resin (c) component is given as z wt% in a triangular component graph in which the upper vertex of a regular triangle is marked as 100 wt% polypropylene resin (a), the lower left vertex as 100 wt% polypropylene resin (b), and the lower right vertex as 100 wt% polypropylene resin (c).

Background

In order to obtain thick polypropylene resin molded foam having excellent appearance and high foaming factor by foam blow-molding, known methods require polypropylene resin having a melt tension (MT) and melt flow rate (MFR) taught by Gokuraku et al. as the base resin. However, polypropylene resin having the taught specific MT and MFR are extremely expensive and make production thereof uneconomical.

However, if ordinary polypropylene resin not having the specific MT and MFR is used, the resulting polypropylene resin molded foam has unsatisfactory thickness, a poor appearance and low foaming factor.

The presently claimed method of obtaining thick polypropylene resin molded foam having excellent appearance and high foaming factor by foam blow-molding at a low cost solves the problem by using a base resin having a plurality of polypropylene resins having MT and MFR in the specific ranges indicated in (i) to (iv) wherein only the specific and unobvious mixtures having the claimed properties results in a satisfactory product.

In particular, the base resins (i) to (iv), (a), (b) and (c) have MT and MFR for base resins are not employed on their own but, instead, the base resins (i) to (iv) are obtained by mixing (a),

(b) and (c) to comprise a plurality (two or more) thereof in respective specified ranges.

For example, the presently claimed base resin (i) is a resin composed of a mixture (resin (a) + resin (b)=100 weight%) of at least 20 wt% and less than 70 wt% polypropylene resin (a) with MT of at least 98 mN and MFR of 0.5 to 15 g/10 minutes, and over 30 wt% and no more than 80 wt% of polypropylene resin (b) with MT of less than 30 mN (excluding 0) and MFR of 2 to 30 g/10 minutes.

Similarly, the base resin (ii) is a resin composed of a mixture (resin (c) + resin (b)= 100 weight%) of 30 to 70 wt% polypropylene resin (c) with MT of at least 30 mN and less than 98 mN and MFR of 2 to 15 g/10 minutes, and 30 to 70 wt% of said polypropylene resin (b).

The base resin (iii) is a resin composed of a mixture (resin (a) + resin (c)=100 weight%) of at least 20 wt% and less than 70 wt% of polypropylene resin (a), and over 30 wt% and no more than 80 wt% of said polypropylene resin (c).

Finally, the base resin (iv) is a resin composed of a mixture (resin (a) + resin (b) + resin (c)=100 weight%) of 5 weight% of 65 weight% of said polypropylene resin (a), 30 weight% to 78 weight% of said polypropylene resin (b), and 5 weight% to 65 weight% of said polypropylene resin (c).

Analysis

The cited reference fails to teach each and every claimed limitation of the invention. Gokuraku *et al.* does not teach the presently claimed base resin mixture of two or more polypropylene resins having the melt tension and melt flow rates in the specified ranges indicated in (a), (b) and (c). Gokuraku *et al.* also fails to teach an admixture of polypropylene resin (c) as a base resin component regarding (ii) to (iv) of the present invention, in which polypropylene resin (c) is admixed. It is clearly apparent that the claimed mixture is completely different than those taught by the reference. Hence, one of ordinary skill in the art would not have had any motivation to combine the polypropylene resins in base resins (ii) to (iv) of the present invention.

Instead, Gokuraku *et al.* teaches a base resin having a polypropylene resin whose melt tension is 10 gf (corresponding to 98 mN) or more and whose melt flow rate is 1 g/10 min or more. Although it is alleged that the ordinary polypropylene resin in the citation may be expected to have properties corresponding to the resin (b) in (i) to (iv) of the present invention, the allegation is completely false.

The ordinary polypropylene resin of Gokuraku *et al.* has a small melt tension (MT) and is indicated as an example of raw

material used to manufacture polypropylene resin and presumably corresponds to xample B, C, D or E (MT: 3 to 0.4 gf (corresponding to 29 to 3.9mN) and MFR: 0.6 to 8 g/10 min) listed in Table 3 of the Gokuraku et al. However, Gokuraku et al. merely teaches that ordinary polypropylene resin may be mixed therewith wherein no teaching relates to the claimed limitations of:

a resin (i) composed of a mixture (resin (a) + resin (b)=100 weight%) of at least 20 wt% and less than 70 wt% polypropylene resin (a) with MT of at least 98 mN and MFR of 0.5 to 15 g/10 minutes, and over 30 wt% and no more than 80 wt% of polypropylene resin (b) with MT of less than 30 mN (excluding 0) and MFR of 2 to 30 g/10 minutes,

a base resin (ii) is a resin composed of a mixture (resin (c) + resin (b)= 100 weight%) of 30 to 70 wt% polypropylene resin (c) with MT of at least 30 mN and less than 98 mN and MFR of 2 to 15 g/10 minutes, and 30 to 70 wt% of said polypropylene resin (b);

a base resin (iii) is a resin composed of a mixture (resin (a) + resin (c)=100 weight%) of at least 20 wt% and less than 70 wt% of polypropylene resin (a), and over 30 wt% and no more than 80 wt% of said polypropylene resin (c);

a base resin (iv) is a resin composed of a mixture (resin (a) + resin (b) + resin (c)=100 weight%) of 5 weight% of 65 weight% of said polypropylene resin (a), 30 weight% to 78 weight% of said polypropylene resin (b), and 5 weight% to 65 weight% of said polypropylene resin (c).

Applicants would like to clarify at this point that the teaching in lines 52 to 60 of col. 2 indicated by the Office Action do not relate to the presently claimed melt tension and melt flow rate of the claimed base resin. In particular, Gokuraku et al. teaches that the melt tension (MT) at 230°C of resin forming a foam layer in a blow-molded foam manufactured from base resin in the citation is 5 gf (corresponding to 49 mN) or more, and that the melt flow rate (MFR) is 1 g/10 min or more. The reference also teaches that the MT and MFR at 230°C of the base resin employed for manufacturing blow-molded foam having a foam layer as described above, in for example claim 8, lines 10 to 15 of column 3 or lines 12 to 17 of column 6 of the reference is that the MT is 10 gf (corresponding to 98 mN) or above and that the MFR is 0.5 g/10 min or above. Moreover, Gokuraku et al. teaches in lines 41 to 48 of col. 7 that the MT is preferably 10 to 50 gf (corresponding to 98 to 490 mN), even more preferably 15 to 30 gf (corresponding to 147

to 294 mN) and that the MFR is preferably 0.5 to 30 g/10 min, even more preferably 1 to 10 g/10 min and most preferably 2 to 10 g/10 min.

However, the taught MT and MFR of the resin that forms the foam layer of the above blow-molded foam of Gokuraku *et al.* are the melt tension and melt flow rate of **defoamed** polypropylene resin obtained by heating and melting resin forming a foam layer of blow-molded foam. See Gokuraku *et al.* col. 12, lines 15 to 30. Hence, the teachings do not and cannot correspond to the melt tension and melt flow rate of the base resin specified in the present invention.

What should properly be compared with the polypropylene resin having the melt tension and melt flow properties of the presently claimed base resin indicated in (i) to (iv) according to the present invention is the disclosure relating to melt tension and melt flow rate taught at claim 8, lines 10 to 15 of col. 3 or lines 12 to 17 of col. 6.

Turning to the allegation that the claimed limitations are inherently contained by the prior art with respect to a composition having the bounds of a quadrangle ABCD (including on the lines of the quadrangle) drawn by connecting with straight lines the: four points A (17, 78, 5), B (5, 72, 23), C (5, 30, 65) , and D (65, 30,

5) which are component coordinates (x, y, z) where the polypropylene resin (a) component is given as x wt%, the polypropylene resin (b) component is given as y wt%, and the polypropylene resin (c) component is given as z wt% in a triangular component graph in which the upper vertex of a regular triangle is marked as 100 wt% polypropylene resin (a), the lower left vertex as 100 wt% polypropylene resin (b), and the lower right vertex as 100 wt% polypropylene resin (c), Applicants note that the allegation is incorrect because the claimed features are not contained by the prior art as shown by the Comparative Examples.

In particular, the Comparative Examples of the present specification show that the object of the present invention cannot be obtained unless the mixing ratios of the base resins in (i) to (iv) claimed in the present invention are satisfied.

In particular, if the mixing ratio in (i) is outside the range, for example Comparative Example 1 $((a)/(b)=85/15$ (weight ratio)) i.e., if the mixing ratio of (a) is more than the specified range and that of (b) is smaller than the specified range, although an excellent foam condition and appearance are obtained, production costs become high.

Similarly, in the case of Comparative Example 2 $((a)/(b)=15/85$ (weight ratio)) i.e., where the mixing ratio of (b) is more than

limitations are results effective variables. The claimed resins are specifically limited to compositions having mathematical features represented by a quadrangle ABCD. See In re Antoine, 195 UPSQ 6 (C.C.P.A. 1977). The understanding that a particular ratio of a melt tension to a melt flow rate for the various components (a) to (c) at a particular ratio and satisfying the relationship of the claimed quadrangle ABCD giving rise to foamed compositions having excellent properties was unobvious at the time the invention was made.

Applicants further note that it would not have been "obvious to try" to vary mixtures because there is no suggestion or teaching in the art that such a modification would result in the excellent properties in view of the many failures of others of skill in the art. Moreover, it would not have been "obvious to try" to vary all the claimed parameters or try each of numerous choices until one possibly arrived at a successful result. Since Gokuraku *et al.* does not give any indication that the claimed limitations result in improved properties, it would not have been obvious to try to make the claims process for producing polypropylene foam articles incorporating the claimed limitations. See In re O'Farrell, 853 F.2d 894, 903, U.S.P.Q.2d 1673, 1681 (Fed. Cir. 1988).

Accordingly, a *prima facie* case of obviousness has not been

the specified range and that of (a) is smaller than the specified range, the cells of the foam layer of the cylindrical foam body obtained are destroyed, resulting in a poor foam condition, so that a foam molding of excellent appearance cannot be obtained.

Where the mixing ratio is (ii) is outside the range, for example Comparative Example 3 $((c)/(b-1)=20/80$ (weight ratio)) i.e., where (b) is more than the specified range and (c) is smaller than the specified range, the cells of the foamed layer of the cylindrical foamed body obtained are destroyed, resulting in a poor foam condition and a foam molding of excellent appearance cannot be obtained.

In addition, in the case where the mixing ratio in (iv) is outside the range, which is the case of Comparative Example 4 $((a)/(b)/(c)=5/90/5$ (weight ratio)), i.e., where (b) is outside the range, the cells of the foam layer of the cylindrical foam body obtained are destroyed, resulting in a poor foam condition and a foam molding of excellent appearance cannot be obtained. In the case of Comparative Example 5 $((a)/(b)/(c)=70/10/20$ (weight ratio)) i.e., where (a) and (b) are outside the range, although the foam condition and appearance are excellent, the manufacturing costs become high.

Applicants also traverse any allegation that claimed

established. Gokuraku *et al.* does not render the presently claimed invention obvious through inherency and there simply is no suggestion in the prior art at the time the invention was made that the claimed limitations result in excellent properties.

Accordingly, Applicants respectfully request withdrawal of the rejections of the claims under § 103.

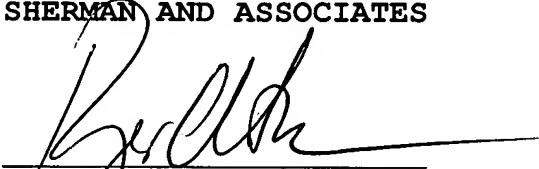
CONCLUSION

In light of the foregoing, Applicants submit that the application is now in condition for allowance. The Examiner is therefore respectfully requested to reconsider and withdraw the rejection of the pending claims and allow the pending claims. Favorable action with an early allowance of the claims pending is earnestly solicited.

Respectfully submitted,

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